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New processes of socialization in education: theoretical analysis, proposals for intervention and formalization with fuzzy models

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Abstract

The paper begins with a methodological orientation of sociological nature in order to lay the groundwork for hypothesis of analysis and definition of the socialization processes that characterize the new generation. The starting point is the deepening of relations between the socio-educational context and the contemporary dynamics of construction of identity and prevalent relationship (intergenerational and peer to peer) among the natives in the digital age. The quantitative aspects of these processes and relationships considered more important for the search results will be analyzed and formalized with the help of an analytic hierarchy analysis, linguistic variables, fuzzy logic and arithmetic. In fact, they allow us to take issues beyond traditional statistical analysis and to represent adequately the semantic uncertainty present in those social phenomena that escape from rigid and uniform classifications.

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1. Processes of socialization and the role of new media

The process of socialization of children is now increasingly expressed through informal and unstructured dynamics that are characterized simultaneously on one hand as participatory, connective and cooperatives, and the other hand as uprooted from the empirical contact with their context and not included in an organized system able to interpret them and guide them in one direction with social purpose (Buckingham, 2004; Caronia, 2002).

These new features, in our opinion, make visible the extent of socio-cultural changes taking place highlighting the trends of development of contemporary society.

They, in fact, make more evident the innovative nature of the complex interactions with which individuals integrate themselves into their communities from the dynamic interaction and contingent with their reference environment increasingly permeated by codes, canons and virtual models (Rheingold H., 1993; Boccia Artieri, 2004; Ardigò A., Mazzoli L., 1990).

This reference environment lives today, in fact, a phase of rapid development and transformation that will be deepened in this work starting from a reflection on the increasingly importance that new technologies acquire in the process of socialization of individuals (Mereyovitz, 1985; Morcellini, 1997, 2002) in a perspective that integrates

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the analysis of macro-social changes and their impact on micro-social level, by examining the co-evolution of contemporary communication and relationship dynamics (de Kerckhove, 1997).

The definition of socialization that we refer to describes an ecological approach (U. Bronfenbrenner, 1979) in which the individual is considered to be an active part of his own learning throughout his life (Elder e O'Rand, 1995; Heinz, 1991; Hurrelmann, Ulich, 1991) in relation to structural conditions (formal and informal) that help or hinder development.

From this point of view, therefore, socialization is constituted as a dynamic relationship through which the individual introjects and elaborates the specific norms, values and symbolic systems of construction and organization of knowledge which refer to the dominant cultural paradigm in a given context.

The individual, therefore, adapts his behavior and his own mode of perception of himself and his environment in this context that in the contemporary era is characterized by the great impact of new media on it.

This constant interplay is aimed at maintaining the balance between the processing path and adaptation of individuals and the tendency to the preservation of norms of the socio-cultural system through the transmission of its values and generates a process that is always open and constantly redefining its parameters to balance the dual tension from one side to the transformation and development and the other to the stability and structural continuity (Berger e Luckmann, 1966).

This process, if it is developed in a functional way, leads to the integration of individuals in their community (Goslin, 1969) and helps to form and reinforce the identity and the social role of the person. A process of functional socialization promotes the skills of self-reflective observation of the rules and the active participation of social interaction in a perspective of autonomy and self-realization (Habermas, 1973) evolving from the changing expectations of the progressive changes in their life phases (Baltes, 1983). This system of expectations is constantly modeling and redefining from continuous interactions that the actor has with Significant Others (Mead, 1934) with which it comes into contact. This perspective involves an active exchange between individuals and their contexts, in a process of communicative interaction aimed at the constant redefinition, elaboration and interpretation of themselves and their experiences from lived communicational relationships.

In other words, socialization is multidimensional and long-term process of communication exchanges between the individual and the various formal and informal agents of the society which aims to integrate him in its socio-cultural environment.

Just the nature of communication, which is the basis for the development of socialization processes, will be the subject of special attention in the course of this analysis. As expert consultants about the dynamics of socialization in childhood, in fact, we note the strong need to investigate the influence that the introduction and fast affirmation of electronic media act in relation to construction processes of identity and relational dynamics and role assignment.

We would also like analyzing the relationship between these changes and the traditional paths of socialization implemented by the school in order to define the impact that the changes in communicational protocols determine on the efficacy of traditional training. The media, in fact, act as real parallel agents of socialization, because they act both at the primary level, influencing the process of internalization of values, roles, attitudes, skills and models previously supplied exclusively by the family, the peers, the books, or the school both on the secondary level, expanding the sphere of knowledge which individuals can access.

The fact that, however, seems even more relevant is that the influence of digital media on the social body does not act only at the level of content transmission, but also as a standard of training, organization and transmission of knowledge (Sartori, 2000) constituting a new decoding logic of perceptual experience that becomes the basis for action conditioning the processes of socialization (De Kerckhove, 1991; J. Van Dijk, 2005).

With this in mind, the new perspective of communication, due to the introduction and rapid spread and success of electronic media, puts a need for further redefinition of paradigms of socialization processes. For this purpose we should start from the elaboration of a theory that combines research at the micro-level with the structural analysis of social dynamics and individual modernization in the macro-level, trying to explain the communicative impact of the change in progress both on the socialization agencies both on the social dynamics of identity and role construction (Sirchia T. 1996; Morcellini, 1997; Cattanei, 2000).

From the above, our research is specifically aimed at taking the first steps to define, through an analytic hierarchy process, the ways in which the change communicational influences the relations of children and, therefore, their processes of socialization and organizational identity, in the belief that the dynamics expressed by members of the new generation will give us broader and punctual indications on how communication is acted from the entire social body. We refer to the children's culture as an authentic emerging culture (Corsaro, Rizzo, 1990), which moves away from the behavioral patterns still valid, even if being overcome, in the dominant level and is constructed with reference to logical and analytical paradigms that express a departure from those of the adult's world. We will analyze, therefore, the consequences that the change in progress, whose impact is particularly strong in the community of children, could lead to both collective and individual processes of socialization.

Since the phenomenon we are discussing eludes scientific classifications and traditional definitions, still largely remained unknown, and considering that in our opinion, there are strong differences between the internal point of view (children) and outside (adult), we decided that our survey methodology was based on direct participation in the activities and in the context of the group studied, in order to establish a relationship of personal interaction with the children involved in research in their daily life environment, reconstructing and understanding their motivations and their logical paths (Jorgeson, 1989). Stimulated by this period of direct observation of two groups of children aged between 4 and 7 years within the context of school and after school, we came to the hypothesis that one of the keys to understand their processes of socialization is the relationship between children and the media (oral - typographic - neo-oral).

This phenomenon will be deepened by means of a hierarchical analytical process that lead to the establishment of relations expressed in linguistic form, and analyzed, in-depth and verified on the ground of change communicational described, starting from a conception of the new media as effective agents of socialization that juxtaposed with traditional ones (family - school - the context of peers).

Our guiding hypothesis is that our social systems - midway between the crisis of scientism, with its unilinear logic, and evolutionary changes produced by the new media - are not yet able to manage change of socialization processes, whose communicational sources and practical effects have yet to be subjected to more detailed work and scientific definition. We believe, therefore, to begin to move into the territories of the unknown it needs a solid methodological framework and sociological theory could provide a valuable key to decrypt the relationship between socio-cultural complexity and education, included in the broader analysis of mechanisms of communicative construction of reality. The education to change of which Mannheim has already spoken (1943), as "undogmatic preparation of the mind, which allows people not to be dragged by the current of events that change, but to cope with it" should, therefore, be able to serve as a sociological analysis capable of grasping the extent of social change to put, through its tools, people, especially younger people, in a position to be able to deal with incisive and effective responses.

We also believe that only by acquiring the necessary knowledge, skills and tools we are able to develop and design effective strategies to support good social and educational processes of formation of functional well-being of people and systems to which they belong. From here the idea of this proposal is able to contribute, using the new theoretical approaches related to clinical sociology and sociotherapy (Fritz, 1985; Sevigny, 1996; Luison, 1998; Welcome, 2002), to the development of scientific research in this area, comforted by Durkheimian indications (Durkheim, 1895) that allow us to consider *social facts* as things in virtue of their effects on people.

2. Communicational changes and socialization

Our research is based on a definition of person to be understood as a complex system of communications that is structured as an adaptive response to the continuous evolution of the interpretive schemes of the environment and socially produced representations of it. These schemes are not only the knowledge base of individuals but are also possible motor action (Mead, 1934; Benvenuti, 2002). Such representations, of course, do not coincide in any way with the environment itself and must be read from time to time from the dominant medium of each reference (Ong, 1982).

A lot of the dysfunctional behavioral dynamics have occurred historically, furthermore, and they can be connected to the historical sequence of the various media (McLuhan, 1962) which sees in times of transition, such as medieval orality to the post - fifteenth-century printing company, moments of crisis about people's organization made visible, e.g., by the expansion of alcoholism from distilled spirits, of robbery, of wandering, etc.

The typographic medium seems to introduce a break in the consciousness of the previous man of orality: the moment fades through the use of human to transmit knowledge, it is as if the symbolic becomes autonomous from direct dependence on the corresponding empirical referent. This is what is sociotherapeutically called the level of the *symbolic autonomy* of punctual and complete descriptions, of research protocols depicted as belonging to a plan entirely made up of representations (RR), detached from the purely empirical level. Today, with the introduction of electronic media, there is a second-level virtualization: while at the first level starting points remained and remain the environment and the direct experience, at the second level, the referent is the first symbolic level that stands as a prerequisite to the creation, organization and transmission of knowledge within a *virtual environment*, a *virtual world*, and a *virtual reality* (Levy, 1997; Turkle, 1996; Benvenuti, 2002).

Starting from the teachings of McLuhan (1962) we can say that the electrical-electronic instruments, born as prosthetic responses that can reduce the complexity of the typographical context, retroactive to the context in which they are introduced, changing it from the structural point of view and driving new theoretical and behavioral paradigms. The neo-media define, in fact, the space of a communication generated by new codes and logical models of construction and transmission of knowledge, replacing those typical of modernity, increasingly inappropriate in defining the specificity of the contemporary context (De Kerchove, 1995). The diffusion and the rapid development of new media communication (computers, Internet, mobile phones, etc.) implies a different form of elaboration, storage and transmission of values, ideas and knowledge than that of nearest past. The dominant medium is no longer typographic (book), often still a reference for the adult generation, but that is what of new technological forms of communication called neo-oral and multisensorial. These forms, in fact, change the amount of the received information and the modalities for their storage and their management.

The electronic media construct a new daily environment of action, of relationship, of production and of existence (Artieri Boccia, 2004) that becomes progressively more complex because it increases the gap between the environment and the skills needed for its decoding and management (Luhmann, 1984). This may create a crisis in the social body due to an inability of both collective and individual construction of *meaning*, understood as the practice of maintenance and reduction of complexity from a process of continuous actualization of the possibility that moves and keeps on a virtual plane all unselected (Luhmann, 1984). We believe that these reflections are the basis of the following affirmation of P. Levy (1997, p.157):

"The appearance of cyberspace does not mean in any way that 'everything' is finally available, but rather that the whole is definitely out of reach".

This means that the plurality of available stimuli, the transmission speed and the multidimensional and multi-sensory content amplify - along with the potential - the dangers associated with a growing sense of disorientation that can compromise the success of the processes of socialization. The reproductive capacity of new media, which offers people an immense range of Representation, is indeed so large to put in crisis the ability to regulate the relations between inside and outside, by increasing on the one hand their access to knowledge and the other hand the fragility and confusion of the social body. This apparent paradox, by which at the same time the new media can potentially increase the chances of individuals, but also place them in a state of confusion and helplessness, is well detailed by sociologist J. Van Dijk (2005). He claims the need for new ways to develop formal socialization taking into consideration the new needs of society, with particular reference to the new generation, for whom the absence of firm points of reference become an increasingly fragility and risk factor (Bensayag, Shmit, 2003). A dangerous factor of disorientation of so many youth is, in fact, due precisely to that feature, typical of a symbolic more or less detached from the empirical, called *symbolic fungibility*: the person, as a function of logical or emotional assonance or both, seems to become able to recognize temporarily himself in various symbolic organizations resulting in what are called *instant identities*, requiring simple temporary membership to its patterns and behavioral criteria (Benvenuti, 2002). Also for this reason the growth paths of youth are often characterized by feelings of instability and disorientation that compromise the processes of identity construction and open to new relationship and learning

dynamics. These trends are well exemplified by the figure of *bricoleur* (Turkle, 1984, 1996), who is able to learn by doing, and to proceed even in the absence of theoretical knowledge through a mode of thought that emphasizes reflection on the experience, even if this were only simulated.

The innovation of the virtual, in fact, is not only relate to the technological aspect, but especially to the cultural aspect because it introduces new ways of encoding / decoding and opens new cognitive styles of communication, relationship and behavior, characterized by a cooperative and immersive nature and an asymmetrical logic (Jenkins, 2006). The sensory experience of perception is systematized and organized through a logical pattern that moves by trial and error, using the analogy, concomitance, creativity, metaphor, intuition, interaction and symbolic image through an approach to the construction of the knowledge of hypothetical-experimental type and of abductive nature (Peirce, 1982). The thinking way of youth is changing from analytical, structured, sequential, nomological and referential to generic, flexible, connective, holistic: the questioning of the disciplinary logic, which has been described by Foucault (1975), starting from one-dimensionality and unidirectionality of choices, seems to assume an ever more powerful and pervasive capabilities (Marcuse, 1964).

The new media are causing real anthropological changes influencing, in the long-term, perceptual and cognitive frameworks, ways of thinking, configurations of knowledge, forms of communication, modalities for relations, organization's policies and standards of behavior and action (De Kerchove, 1991).

From the foregoing and in order to analyze and define more precisely the most important aspects of contemporary socialization processes in childhood, trying to understand and explain the behaviors that seem to diverge from the traditional explanatory models inherited from the modern social and pedagogical sciences, we used the analysis tools provided by fuzzy sets, in particular fuzzy relations (Zadeh, 1975; Klir, Yuan, 1995; Ragin, 2000; Maturo et al., 2008; Blezza, 2008) that specify the degree of participation and involvement of the individual to every relation and communication. The perspective is that the process of socialization is the result of the set of constantly evolving relationships lived. These relations can never be considered as neutral, on the contrary, their influence on the socialization process depends strongly on the communicative medium of reference for the actors involved and on the degree of emotional investment in the medium.

Some logic and methods for aggregating fuzzy scores to make decisions in the presence of multiple objectives are detailed in (Klir and Yuan, 1995, Maturo, 2009, Maturo, Ventre, 2009).

From the general framework outlined and in the light of these presuppositions, therefore, in the next section, we will analyze some of the fundamental aspects in our view of these relations, specifying that for each variable it will be important to specify the gender, class, affiliation and age. More precisely, we shall focus on the socialization processes that are defined on the basis of the relationship between children and media, formalized through an analytical process hierarchical and fuzzy relations. The results obtained are then used to analyze the alternatives of intervention to improve the processes of socialization of children with a view to their well-being.

3. Formalization of the dynamics of socialization with a hierarchical analytical process and fuzzy relations

We introduce a proposal for analyzing the relationship of a group U of individuals with a set M of media based on a hierarchical analytical process and fuzzy relations. Our proposal is based on the idea that the formalization of the dynamics of socialization can be done, at least in the first part, with a procedure similar to that introduced in (Saaty, 1980) in decision theory and depth in several subsequent works. The mathematical tools used are the theory of directed graphs (also called digraphs) (see, e.g., Knuth, 1973), linear algebra and the theory of fuzzy relations (see, e.g., Klir, Yuan, 1995). In particular, we consider directed graphs without circuits in which each sink vertex, i.e. such that there are no outgoing arcs from it, is associated with a fuzzy relation.

The procedure consists of 3 phases (or steps):

(Step 1) Hierarchical structuring of the problem by means of a directed graph without circuits;

(Step 2) Assigning weights to the arcs, paths and vertices of the digraph;

(Step 3) Representation by fuzzy sets of relations expressed in linguistic form and associated with sink vertices.

3.1. Hierarchical structuring of the problem

The overall goal, or objective of level 1, is specified by means of specific objectives, called objectives of level 2. In general, defined the objectives of level k , they can be specified by the objectives of level $k+1$. On the last level of the analytic specification process, for example, at level n , we find names, each of which is a fuzzy property, expressed in human language with an attribute or predicate, concerning the elements of the Cartesian product $U \times M$. It defines in a vague, approximate language (and to be interpreted with the help of experts) of instant verbal communication, a fuzzy relation among the elements of U and those of M , set of media. Let us call "linguistic relations" n -level elements.

In our work we propose a hierarchical structuring of the problem in 5 levels. At level 1 you place the goal or general objective "formalization of the relationship of the group U with the collection of media M ". At second level we consider the particular objectives of formalization of "objectively observable relations" and "subjectively perceived relations". At third level we consider two additional categories, that of "formal socialization processes" and "informal socialization processes", each of which refers to both the objectives of level 2. Both categories are further specified in specific sub-objectives or objectives of level 4, some of which are: "processes of socialization" of school, family, peer group, new media.

In the last level, level 5 of the analytic process specification, we consider names such as "frequency", "intensity", "trust", "influence", "addiction" etc. Each of which is a *fuzzy property*, expressed in the usual language, regarding the elements of the Cartesian product $U \times M$.

In conclusion, the first phase of the analysis of the relationship of the set U of individuals with the collection M of media (stage of structuring the hierarchy problem) consists in the construction of a directed graph $G = (V, A)$, where V is the set of vertices, $A \subseteq V \times V$ is the set of arcs, such that the following conditions are met:

- (1) there exists a partition of V in n subsets, called *levels* (in our application $n = 5$);
- (2) only one vertex belongs to level 1 (the *root* of G), which represents the general objective (*overall goal*);
- (3) if v is a vertex of level $k < n$ there exists at least one outgoing arc from v and all outgoing arcs from v have as second extreme a vertex of level $k+1$;
- (4) if v is a vertex of degree $k > 1$ there is at least one arc with v as the second extreme;
- (5) there are no outgoing arcs from a vertex of degree n , i.e. from a linguistic relation.

3.2. Assigning weights to arcs, paths and vertices of the digraph

Suppose that the outgoing arcs from a vertex v of level k are a_1, a_2, \dots, a_r where the arc a_i connects v with a vertex u_i of level $k+1$. A committee of experts assigns a weight w_i to the arc a_i with the condition that the weights are nonnegative and their sum is equal to 1. The weight w_i should indicate the *degree of importance* of u_i with respect to v . The weights are determined by the method of paired comparisons (Saaty 1980, Maturo, Ventre, 2009).

Assigned weights to the arcs of the graph, for each path of the graph the *weight of the path* is defined as the product of the weights of the arcs that belong to the path. Finally, for each vertex v of the graph the weight of v is the sum of the weights of outgoing paths from the root and arriving at the vertex v .

In particular, it is assigned a weight to each linguistic relation and the sum of the weights of the linguistic relations is equal to 1.

3.3. Representation of linguistic relations with fuzzy sets and overall relation

A linguistic relation between the elements of U and those of M is interpreted as a *fuzzy relation*, i.e. a fuzzy set with domain $U \times M$. For example, the "trust" of individuals on the various media is a function $\varphi: U \times M \rightarrow [0, 1]$ such that $\varphi(u, m)$ is the degree to which the individual u has confidence in the medium m . In particular, $\varphi(u, m) = 1$ if the individual u has total confidence in the information coming from m and $\varphi(u, m) = 0$ if u has no confidence in m . If w is the weight of the linguistic relation "trust" then the product $w \varphi(u, m)$ measures the *overall importance* of the relationship between u and m .

Let $\varphi_1, \varphi_2, \dots, \varphi_h$ be the fuzzy sets associated to the linguistic relations and let w_i be the weight of φ_i . Then the overall relationship between the individuals and the media can be represented by the "overall fuzzy set":

$$\varphi = w_1\varphi_1 + w_2\varphi_2 + \dots + w_h\varphi_h. \quad (1)$$

The fuzzy set φ summarize the information contained in the digraph that analyzes the problem and is the starting point for a number of conclusions on the relationship between the elements of U and all media. In particular we can:

- construct a ranking of the media by the sum of the values that take into φ ;
- evaluate the overall impact of media on individuals of the group U ;
- introduce a distance between the elements of U ;
- make a crisp or fuzzy cluster analysis of the elements of U ;
- if U is a group of children to enable procedures to improve or standardize learning.

4. Conclusions, recommendations and further developments of the research

An important application of the analysis in the preceding Sec. is the ranking of the possible alternatives for action (i.e. the identifiable and practicable alternatives, within the environmental, human, logistic, and social constraints). The assignment of values to the different intervention alternatives can find the best route possible in a given situation to build a prevention project for the reduction of the possibility of occurrence of inconvenience to the new communicational dynamics.

The procedure we propose consists of 4 phases (or steps):

(Step 1) Finding alternatives for action identified in accordance with our knowledge and that are compatible with the constraints;

(Step 2) Assigning scores to the alternatives of action with respect to linguistic relations;

(Step 3) Research of the possibility of mixed strategies and their assignment of score;

(Step 4) Choice of alternative with the help of industry experts, technical and political.

The formalization and the experimentation of these alternatives will also have a function to form the basis for a process of systematization of a new corpus of knowledge, strategies and tools for supporting the process of teacher training so that they become self-aware, and able to enhance and promote the diversity of communicational codes of children. This also means lay the basis for identifying the elements to be enhanced in order to support and strengthen the connection between the various agencies of socialization in order to facilitate the transfer of functional experience to the success of the socialization processes from one context to another building bridges linking the different symbolic levels experienced by individuals.

Finally, we remark that the use of fuzzy logic and analytical hierarchy process allows us a greater development in Social Research when, proceeding in the empirical research, it is not possible to observe a large number of cases, i.e. a meaningful number from the statistical point of view, but only a limited number of cases or when the cases observed are qualitatively different (Ragin, 2000).

In fact, fuzzy set theory makes possible the formalization of both quantitative and qualitative aspects in the same mathematical model and then it is able to capture aspects that are beyond the traditional statistical analysis, based on the consideration of homogeneous statistical units. Moreover, fuzzy numbers allow us to formalize and control the uncertainty inherent in human reasoning.

These approaches also seem particularly appropriate to the phase that is going through of communicational change of paradigm as it allows to avoid rigid definitions and classifications of units.

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